Novel Features in the WARP-POSINST Code Suite, toward Self-Consistent Simulations of High-Intensity Beams and E-Clouds

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WARP-POSINST is a 3-D parallel particle-in-cell accelerator code with advanced features (such as mesh refinement, a new "drift-Lorentz" particle mover for tracking charged particles in magnetic fields using large time steps, disparate adaptive time stepping), complemented by a comprehensive set of modules for the modeling of e-cloud (detailed model of secondary emission, photo-emission, neutrals emission, ionization). It is being applied to the modeling of ion beams (1 MeV, 180 mA, K+) for heavy ion inertial fusion and warm dense matter studies, as they interact with electron clouds in the High-Current Experiment (HCX) and Neutralized Drift Compression Experiment (NDCX), as well as to the numerical study of electron cloud effects in high-energy accelerators, such as the High Intensity Neutrino Source (HINS) main injector, the Large Hadron Collider (LHC) and the International Linear Collider (ILC). We describe the capabilities, and present a set of selected results from its application to the above-mentioned accelerators, including detailed comparisons against the HCX experiment.

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